Volunteer Lake Assessment Program Individual Lake Reports

RAND POND, GOSHEN, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	326	**Max. Depth (m):**	8.2	**Flushing Rate (yr^{-1})**	1.4
Surface Area (Ac.):	39	**Mean Depth (m):**	3.4	**P Retention Coef:**	0.66
Shore Length (m):	1,800	**Volume (m^3):**	534,000	**Elevation (ft):**	1257

TROPHIC CLASSIFICATION

Year	Trophic class
1979	OLIGOTROPHIC
1994	OLIGOTROPHIC

KNOWN EXOTIC SPECIES

The Waterbody Report Card tables are generated from the DRAFT 2014 305(b) report on the status of N.H. waters, and are based on data collected from 2004-2013. Detailed waterbody assessment and report card information can be found at www.des.nh.gov/organizations/divisions/water/wmb/swqa/index.htm

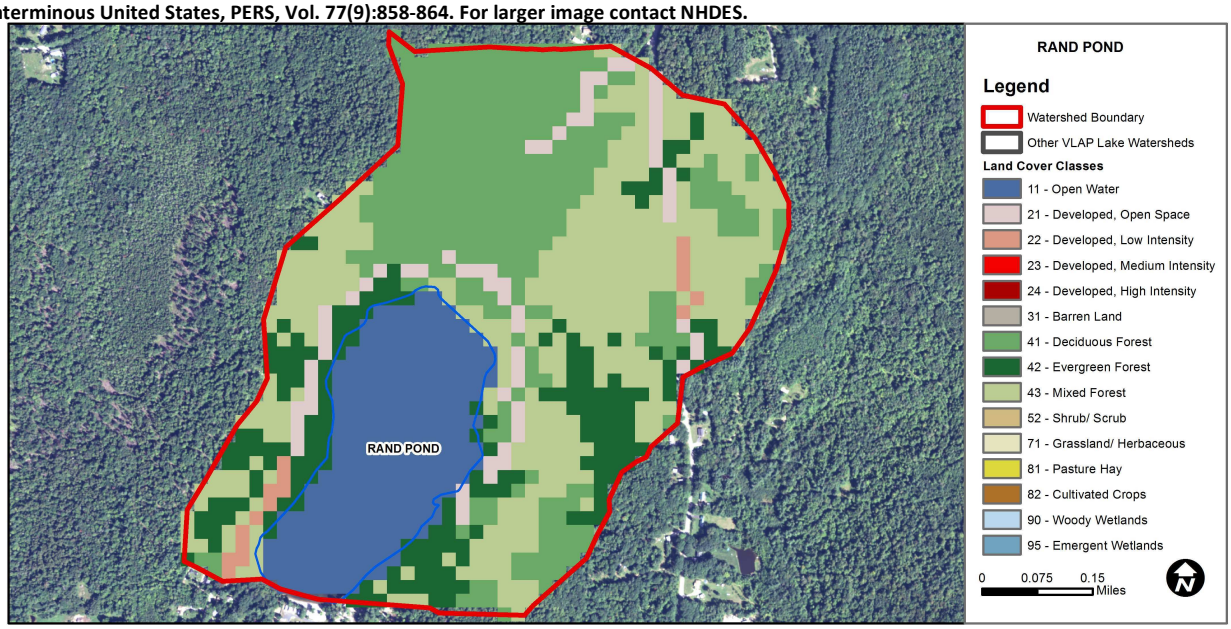
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator and the chlorophyll a indicator is okay.
	pH	Slightly Bad	>10% of samples exceed criteria by a small margin (minimum of 2 exceedances).
	Oxygen, Dissolved	Encouraging	There are < 10 samples with 0 exceedances of criteria. More data needed.
	Dissolved oxygen satura	Encouraging	There are < 10 samples with 0 exceedances of criteria. More data needed.
	Chlorophyll-a	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator.
Primary Contact Recreation	Escherichia coli	Encouraging	There are no geometric means or there are > 2 single samples but those samples are within 75% of the geometric means criteria. More data needed.
	Chlorophyll-a	Very Good	There are a total of at least 10 samples with 0 exceedances of indicator.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

RAND POND - PUBLIC WAY BEACH	Escherichia coli	Very Good	Where there are no geometric means, all bacteria samples are < 75% of the geometric mean. Where there are geometric means all single bacteria samples are < the SSMC and all geometric means are < geometric mean criteria.

WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.



Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	17.8	Barren Land	0	Grassland/Herbaceous	0
Developed-Open Space	5.5	Deciduous Forest	28.43	Pasture Hay	0
Developed-Low Intensity	1.42	Evergreen Forest	15.09	Cultivated Crops	0
Developed-Medium Intensity	0	Mixed Forest	32.02	Woody Wetlands	0
Developed-High Intensity	0	Shrub-Scrub	0	Emergent Wetlands	0

Volunteer Lake Assessment Program Individual Lake Reports

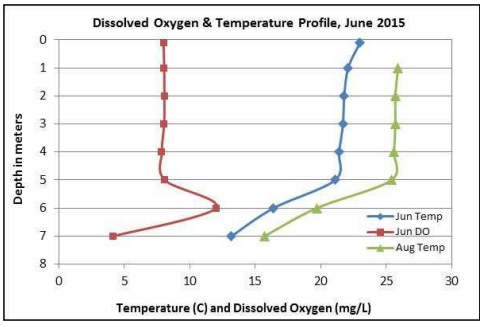
Rand Pond, Goshen

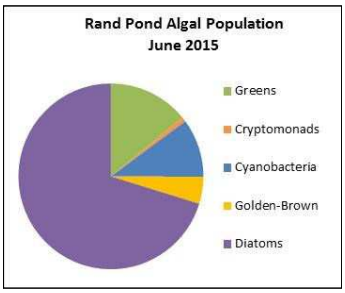
2015 Data Summary

Recommended Actions: A significant storm event in June led to elevated phosphorus, conductivity and turbidity in the Inlet and the pond. This highlights the importance of managing stormwater runoff from dirt/gravel roads, sandy beaches, unstable shorelines, and steep slopes. Identify areas of erosion in the watershed and utilize DES' "NH Homeowner's Guide to Stormwater Management" to install stormwater controls where possible. A cyanobacteria bloom was noted in early September and this highlights the delicate balance of the lake ecosystem. Minimizing nutrient loads to the pond is important to control algal and cyanobacteria blooms. Regularly pump septic systems, use phosphate free fertilizers, and maintain a vegetated shoreline to help reduce nutrient loading to the pond. Keep up the great work!

Observations (*Refer to Table 1 and Historical Deep Spot Data Graphics)*

- **Chlorophyll-a:** Chlorophyll increased gradually from low to average levels as the summer progressed. Average chlorophyll levels decreased slightly from 2014 and were less than the state median. Historical trend analysis indicates relatively stable chlorophyll with moderate variability between years.
- **Conductivity/Chloride:** Epilimnetic (upper water layer), hypolimnetic (lower water layer) and Outlet conductivity levels were slightly greater than the state median but not above a level of concern. Inlet conductivity was slightly elevated in June and then decreased to average levels in August and September. A significant storm event and stormwater runoff may have contributed to the elevated conductivity.
- **Total Phosphorus:** Epilimnetic phosphorus remained low and less than the state median. Historical trend analysis indicates relatively stable epilimnetic phosphorus with moderate variability between years. Hypolimnetic phosphorus was slightly elevated in August potentially due to low water levels and the sample being collected closer to the bottom sediment/water interface. Inlet phosphorus levels were elevated in June following the significant storm event. Outlet phosphorus levels were slightly elevated in September potentially due to low flow conditions.
- **Transparency:** Transparency was within an average range and remained stable from June through September. Average transparency was stable with 2014 and slightly better than the state median. Historical trend analysis indicates relatively stable transparency with moderate variability between years.
- **Turbidity:** Epilimnetic turbidity was slightly elevated in June potentially due to stormwater runoff from the significant storm event prior to sampling. Hypolimnetic turbidity was also slightly elevated in June potentially due to a layer of algae at 6 meter which is also supported by the spike in dissolved oxygen levels at 6 meters as seen in the dissolved oxygen and temperature graphic. Inlet turbidity was also elevated in June following the storm event. Outlet turbidity was elevated in August and sediment and organic matter were noted in the sample.
- **pH:** Epilimnetic, hypolimnetic, Inlet, and Outlet pH levels were within the desirable range 6.5-8.0 units, however historical epilimnetic and hypolimnetic pH levels have fluctuated below the desirable range. Historical trend analysis indicates significantly decreasing (worsening) epilimnetic pH since monitoring began.





Station Name	Table 1. 2015 Average Water Quality Data for RAND POND							
	Alk. mg/l	Chlor-a ug/l	Cond. uS/cm	Total P ug/l	Trans. m		Turb. ntu	pH
					NVS	VS		
Epilimnion	9.8	3.41	71.9	8	3.70	3.83	1.43	6.65
Hypolimnion			73.2	14			2.33	6.78
Inlet			94.3	12			1.46	6.79
Outlet			71.3	11			1.71	6.89

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.
Alkalinity: 4.9 mg/L
Chlorophyll-a: 4.58 mg/m^3
Conductivity: 40.0 uS/cm
Chloride: 4 mg/L
Total Phosphorus: 12 ug/L
Transparency: 3.2 m
pH: 6.6

NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
Chloride: > 230 mg/L (chronic)
E. coli: > 88 cts/100 mL – public beach
E. coli: > 406 cts/100 mL – surface waters
Turbidity: > 10 NTU above natural level
pH: between 6.5-8.0 (unless naturally occurring)

Historical Water Quality Trend Analysis

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	Stable	Trend not significant; data highly variable.	Chlorophyll-a	Stable	Trend not significant; data moderately variable.
pH (epilimnion)	Worsening	Data significantly decreasing.	Transparency	Stable	Trend not significant; data moderately variable.
			Phosphorus (epilimnion)	Stable	Trend not significant; data moderately variable.